

OPERATOR'S MANUAL

FPD 50 WATT POWER SUPPLY

Flat Pack Single Output DC to DC Converter
100 Watt Output
150 Vdc Nominal Input

KEPCO INC.
An ISO 9001 Company.

MODEL FPD 50W-150V POWER SUPPLY

IMPORTANT NOTES:

- 1) This manual is valid for the following Model and associated serial numbers:

MODEL	SERIAL NO.	REV. NO.
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- 2) A Change Page may be included at the end of the manual. All applicable changes and revision number changes are documented with reference to the equipment serial numbers. Before using this Operator's Manual, check your equipment serial number to identify your model. If in doubt, contact your nearest Kepco Representative, or the Kepco Documentation Office in New York, (718) 461-7000, requesting the correct revision for your particular model and serial number.
- 3) The contents of this manual are protected by copyright. Reproduction of any part can be made only with the specific written permission of Kepco, Inc.

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**FLAT PACK
Single Output
DC to DC Converters**

I INTRODUCTION:

SCOPE OF MANUAL: This Instruction Manual contains information for the installation and operation of the Kepco FPD 50W-150 DC to DC Converter Series of switching power supplies. For further operating and service information for the FPD 50W-150 DC to DC Converter Series contact your Kepco Representative directly, or write to Kepco, Inc., 131-38 Sanford Avenue, Flushing, New York 11352 U.S.A.

DESCRIPTION: The Kepco FPD 50W-150 DC to DC Converter Series consists of four switching power supplies, having a nominal 110 to 165 Vdc input and different DC output voltages, rated as listed in Section II. FPD 50W-150 DC to DC Converter switching power supplies have similar electrical specifications, except for the output ratings. They are low-dissipative stabilizers, using pulse-width modulation to control the output. The units feature input/output isolation and remote ON/OFF. Remote ON/OFF is achieved by an isolated TTL level that may use either mechanical or solid state closure for turn-off. All models are guaranteed for one year when operated within the specifications given herein.

II MODELS:

The following specifications apply to the power supply models listed below:

MODEL	INPUT	OUTPUT
FPD 5-10-150	110-165 Vdc	5 Vdc 10A
FPD 12-4.2-150	110-165 Vdc	12 Vdc 4.2A
FPD 15-3.4-150	110-165 Vdc	15 Vdc 3.4A
FPD 24-2.1-150	110-165 Vdc	24 Vdc 2.1A

III SPECIFICATIONS:

Nominal Input Voltage:	110-165 Vdc
Input Voltage Range:	90-185 Vdc
Input Current:	0.75/0.5A Maximum, 110 /165 Vdc
Brownout Voltage:	88 Vdc
Efficiency:	80 percent Typical
Switching Frequency:	500 kHz Typical
Circuit Type:	Forward Converter
Soft Start Circuit:	None
Input Fuse:	None ⁽¹⁾
Leakage Current:	1000pF Y Capacitors are connected between (+) and (-) input terminals and G terminal (See Figure 2)

⁽¹⁾ Recommended outer fuse is 1.5 to 2.0A. Connect fuse to (+) input line (See Figure 2)

IV OUTPUT SPECIFICATIONS:

MODEL	FPD 5-10-150	FPD 12-4.2-150	FPD 15-3.4-150	FPD 24-2.1-150
Output Voltage Nominal	5V	12V	15V	24V
Output Current Nominal	10A	4.2A	3.4A	2.1A
Output Power Maximum	50W	50.4W	51.5W	50.4W
Voltage Adjustment Range (Fig. 3)	4.0~ 5.5V	10.8~13.2V	13.5~16.5	21.6~26.4
Ripple, Maximum 0-50 Degrees C 10-100 % Load	150mV p-p	200mV p-p	200mV p-p	200mV p-p
Noise, DC to 50 MHz, Maximum 0-50 Degrees C 10-100% Load	250mV p-p	300mV p-p	300mV p-p	400mV p-p
Overcurrent Setting Square Wave Characteristic	10.3~13.5A	4.3~5.7A	3.5~4.5A	2.2~2.9A
Overvoltage Setting Shut Down Characteristic	5.5~6.9V	13.7~15.7V	17.0~19.0V	27.0~30.5V

Source Effect	0.5% Typical — 2% Maximum (Min - Max Input)
Load Effect	1% Typical — 2% Maximum (10-100% Load)
Temperature Effect	0.5% Typical — 2% Maximum (0-71 Degrees C)
Combined Effect	±1.5% Typical — ±3% Maximum (Source, Load, Temperature)
Time Effect	0.1% Typical — 0.5% Maximum (0.5~8 Hours at 25 Degrees C)
Recovery Characteristics 50 to 100% Load Change	Less Than ± 4 Percent Excursion . Recovery to within 1 percent in less than 1ms (tr, tf of load change ≥ 50 μs at 110-165V Input)
Remote Sensing	Remote Sensing compensates for voltage drops of up to 0.4V per wire (0.25 Volts for the FPD 5-10-150 Model)
Remote ON/OFF	Primary Side of Circuit Between the RC and (-) Input Terminals: Open or 2.5 -5 Volt: Output ON 0 to 0.4 Volts: Output OFF

V GENERAL SPECIFICATIONS

SPECIFICATIONS		CONDITIONS
Temperature	Operating 0~71 Degrees C Storage - 40 ~ 75 Degrees C	See Figures 5A and 5B
Humidity	Operating and Storage: 20 ~ 95 percent RH	Wet bulb temperature < 35 Degrees C - Non Condensing
Vibration	5 ~10Hz — 10mm Amplitude 10 ~55Hz — 2G Acceleration	Non-Operating 1 Hour on each 3 axis (x, y and z)
Shock	20 G 11± 5 ms Pulse Duration	Non-Operating, 1/2 Sine Pulse - 3 Shocks each axis (x, y and z)
Dielectric Strength	Input-Output: 2.0 KVdc 1 minute Input-Ground: 2.0 KVdc 1 minute	at 25 Degrees C 65 percent RH
Isolation Resistance	Output-Ground: >100M ohm, 500 Vdc	
Dimensions	4.53 in. (115 mm) x 2.28 in. (58 mm) x 0.52 in. (13.2 mm)	See Mechanical Outline Drawing, Figure 1
Weight	0.265 lbs (120 grams) Maximum	
Cover Material	Plastic (UL94V-O) Resin	
Safety	Designed to meet UL478 and CSA E.B. No. 1402B Level 1	

VI REMOTE SENSING

Two terminals are provided for remote error sensing (see Figure 4). Remote error sensing can compensate for load wire voltage drops of up to 0.40 Volts per wire (0.25 Volts for the FPD 5-10-150 unit). The DC to DC converter will not operate if there are no connections between the Sense and Output terminals, either at the load or at the DC to DC Converter output terminals.

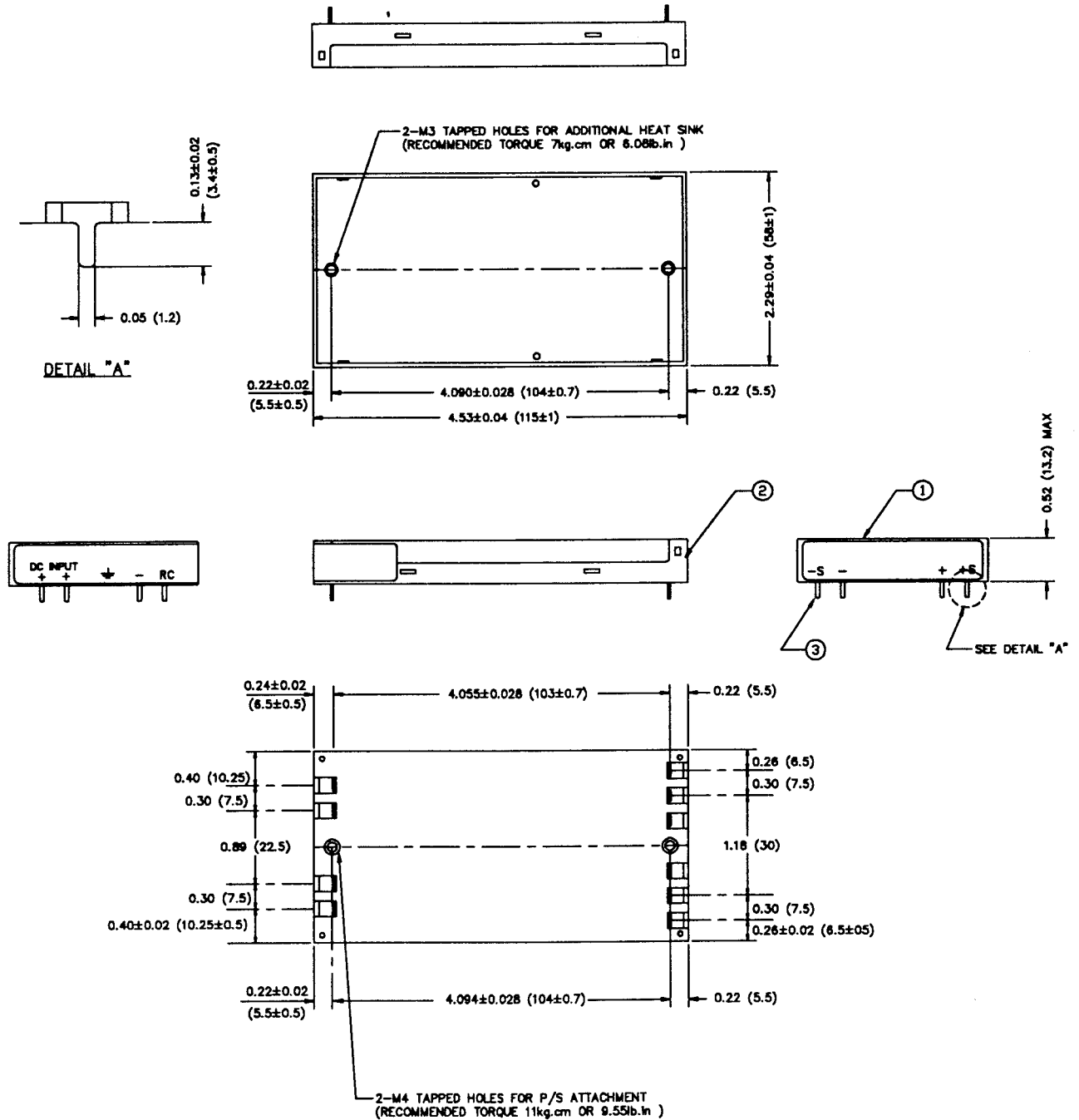
VIII COOLING

The use of a Heat Sink, Kepco Model FIN 50, improves the performance of the FPS 50W-150 DC to DC converter (see Figure 6 for horizontal mounting of the DC to DC converter). The unit can also be mounted vertically as long as the direction of air flow is as shown.

The Output Power Ratings graph of the FPD 50W-150 unit (see Figure 5A) is based on two conditions:

1. The use of a Heat Sink (with air flow of 1.7m/sec(5.58 f/sec)).
2. The temperature of the FPD 50W-150 unit case surface must comply with the specifications shown in Figure 5B.

For example, at 50°C (ambient temperature) the power rating of the FPD unit is 100%, only when the case temperature is maintained at 70°C, or less. Similarly, at 60°C (ambient temperature) the power rating of the FPD unit is derated to 65%, only when the case temperature is maintained at 77°C, or less. At 71°C (ambient temperature) the power



NO.	ITEM	QTY.	MATERIAL DESCRIPTION
3	TERMINAL	8	COPPER ALLOY, 0.01(0.3) THICK, SOLDER PLATED
2	COVER	1	HEAT-RESISTANT RESIN
1	HEAT SINK	1	ALUMINUM

NOTES:

1. DIMENSIONS IN PARENTHESES ARE IN MILLIMETERS, ALL OTHERS ARE IN INCHES.
2. MAXIMUM PENETRATION FOR SCREWS FOR M3 AND M4 MOUNTING HOLES NOT TO BE MORE THAN 0.24in (6mm) FROM CASE SURFACE.
3. ±0.01in. (±0.3mm) TOLERANCE UNLESS OTHERWISE SPECIFIED.
4. KEPCO SUPPLIES THE FOLLOWING HARDWARE FOR FPD METRIC INSERTS:
TWO METRIC M3 SCREWS WITH CAPTIVE
FLAT AND LOCK WASHERS P/N 501-0062
TWO METRIC M4 SCREWS WITH CAPTIVE
FLAT AND LOCK WASHERS P/N 501-0035
TWO NYLON WASHERS (FOR INSULATION) P/N 103-0144.

FIGURE 1 MECHANICAL OUTLINE DRAWING OF THE FPD 50W-150 DC TO DC CONVERTER

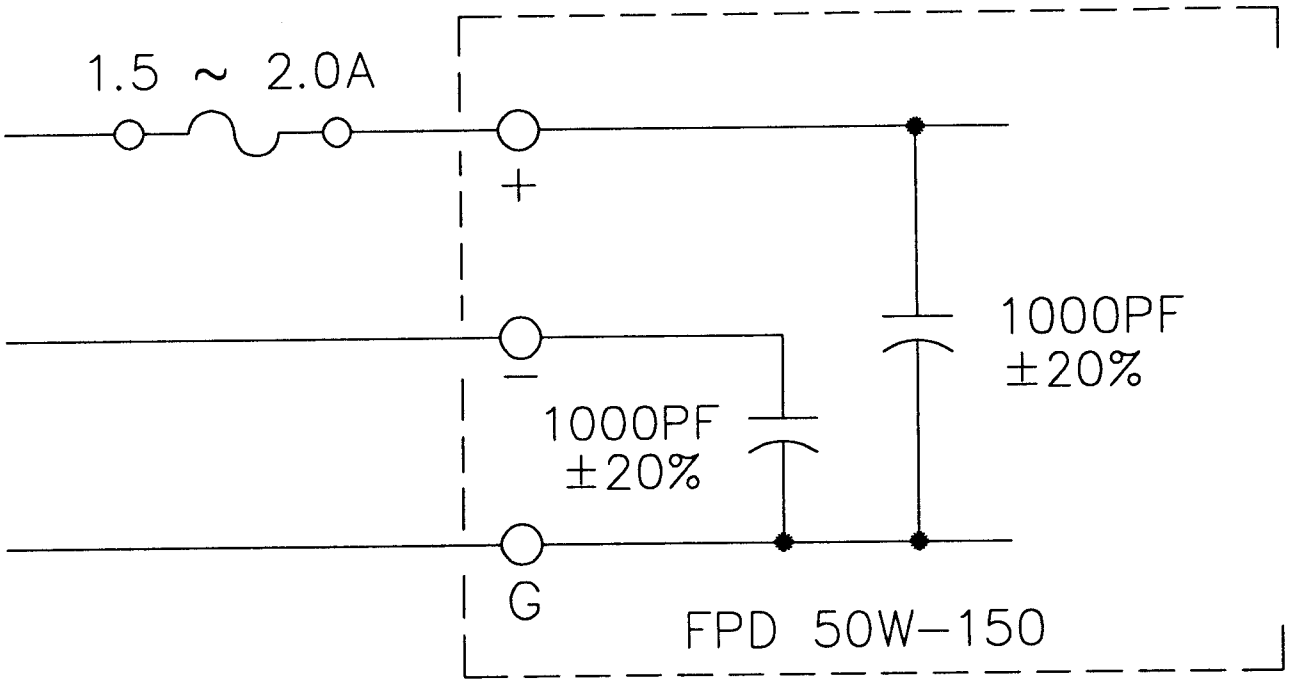


FIGURE 2 RECOMMENDED EXTERNAL FUSE 1.5 TO 2.0A CONNECTED TO THE (+) INPUT LINE OF THE FPD 50W-150 DC TO DC CONVERTER

ADJUSTABLE CIRCUIT

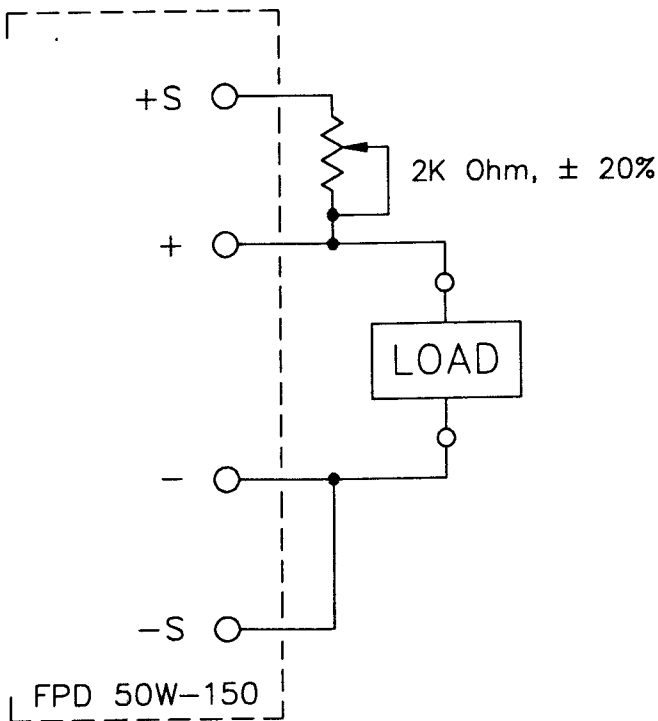


FIGURE 3 (LEFT) THE FOLLOWING CIRCUIT CAN BE USED, WITH THE ADDITION OF A TRIMMER RESISTOR, TO PERMIT CONTROL OF THE OUTPUT VOLTAGE WITHIN PUBLISHED SPECIFICATIONS

REMOTE SENSING CIRCUIT

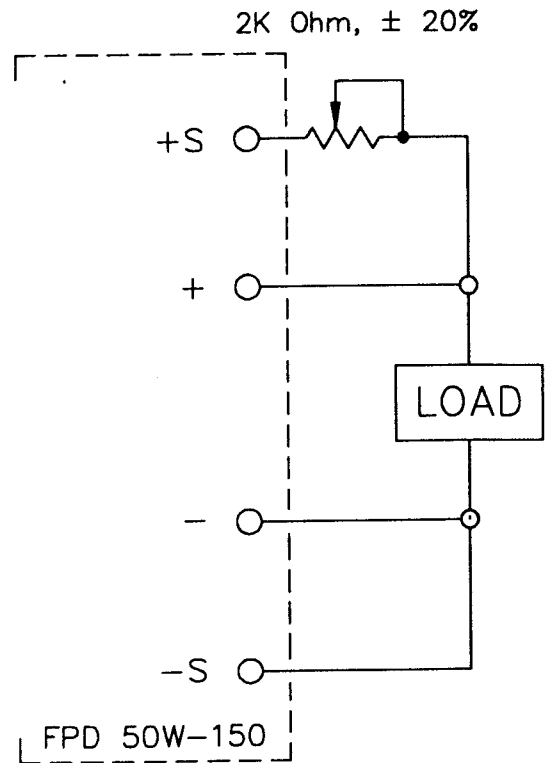
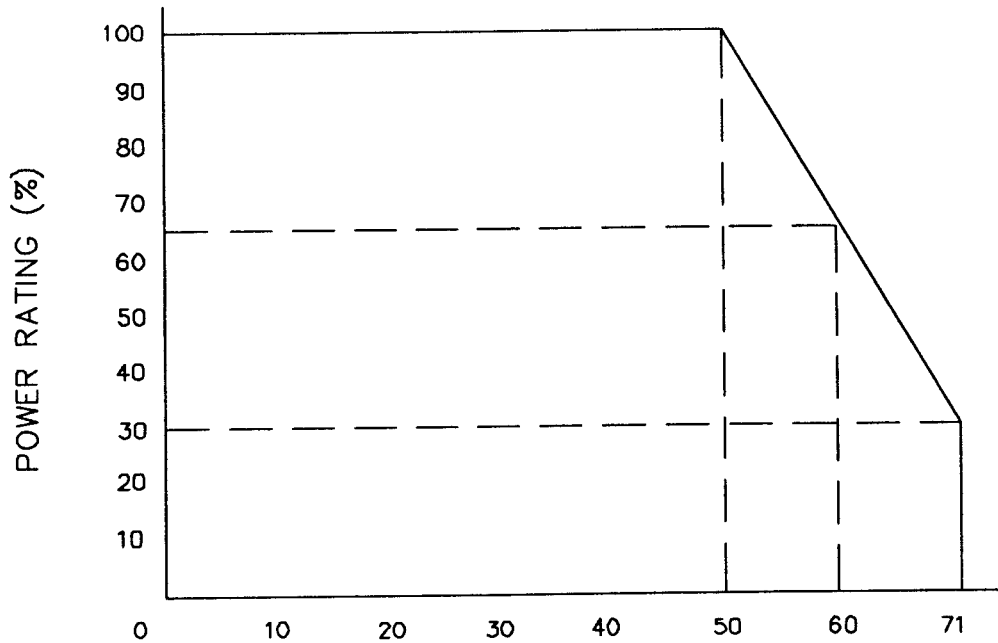


FIGURE 4 (RIGHT) FPD 50W-150 DC TO DC CONVERTER WITH REMOTE SENSING

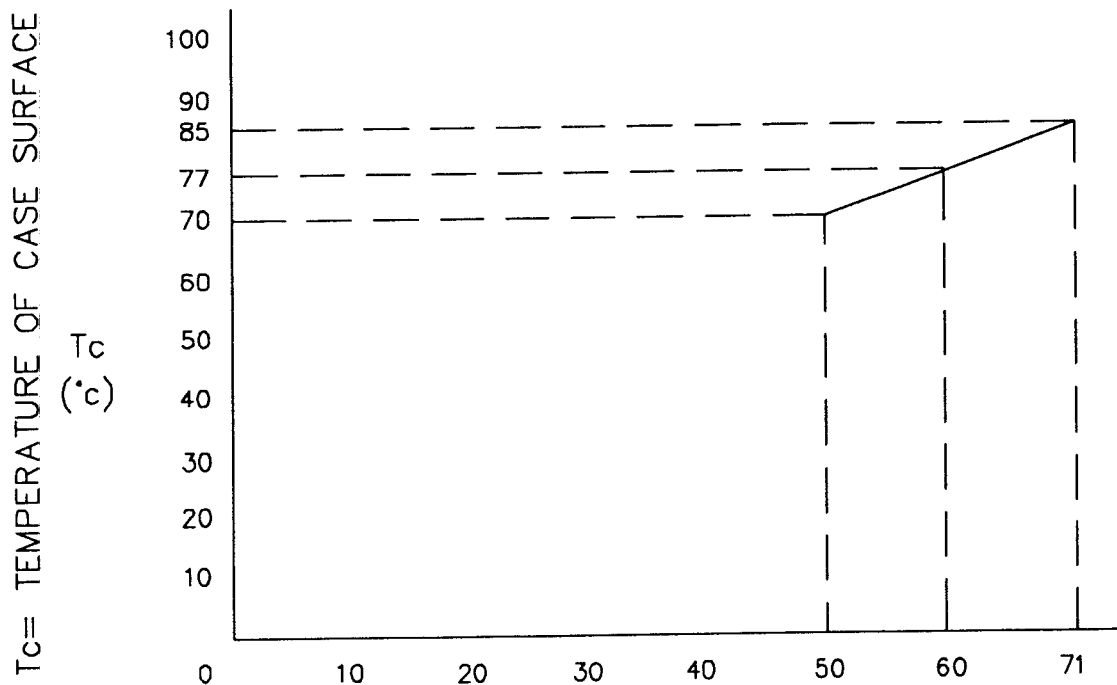
OUTPUT POWER RATING



(5A) AMBIENT TEMPERATURE (DEGREES C)

FIGURE 5A PERCENT OUTPUT POWER RATING VERSUS AMBIENT TEMPERATURE (DEGREES C) FOR THE FPD 50W-150 DC TO DC CONVERTER (SEE CONDITIONS 1 AND 2)

CONDITION 1: With a 4.53 (115) x 2.22 (56.5) x 0.47 (12) Heat sink on the power supply and air flow over 1.7m/sec



(5B) AMBIENT TEMPERATURE (DEGREES C)

CONDITION 2: **FIGURE 5B** FOR FIGURE 5A TO BE VALID, THE TEMPERATURE OF THE DC TO DC CONVERTER CASE SURFACE- T_c MUST BE LESS THAN THE VALUES INDICATED IN FIGURE 5B

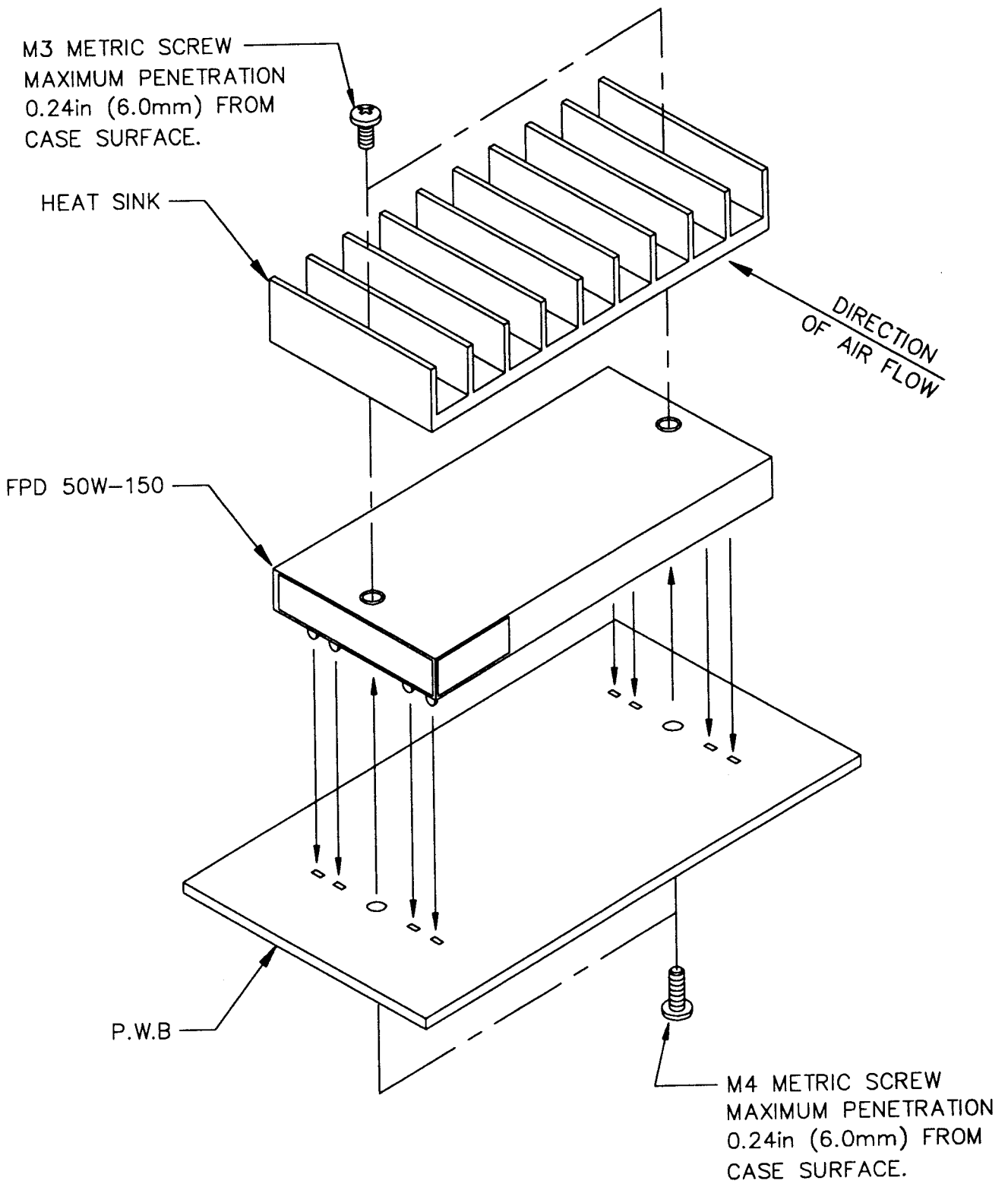


FIGURE 6 HEAT SINK FOR HORIZONTAL OR VERTICAL MOUNTING OF THE FPD 50W-150 DC TO DC CONVERTER

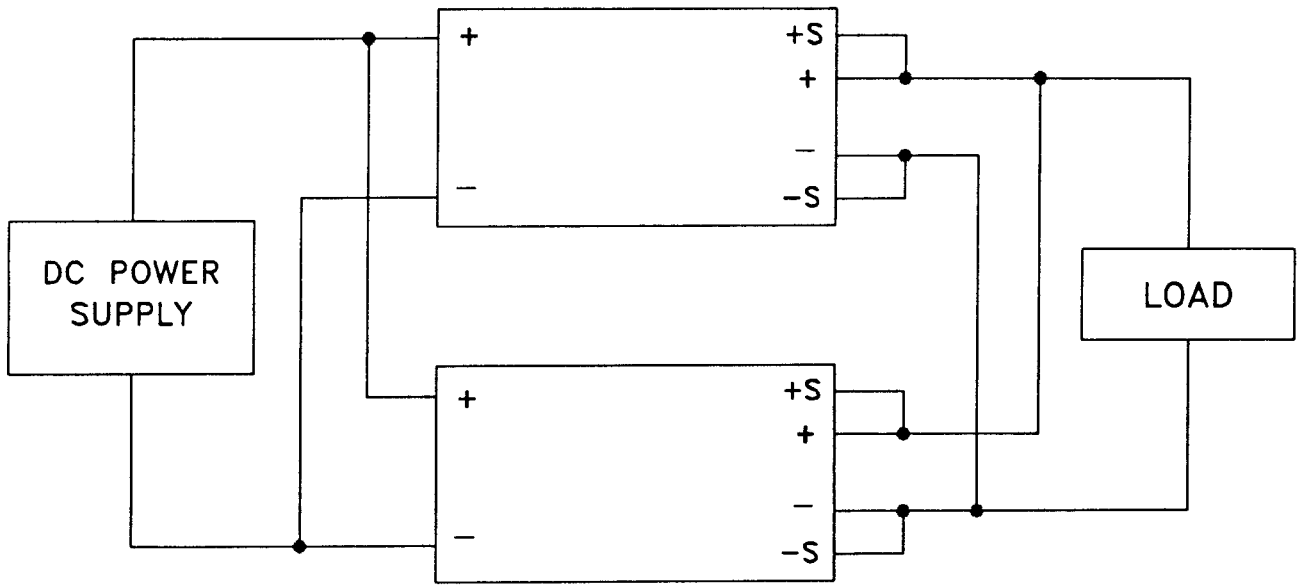


FIGURE 7 CONNECTION FOR PARALLEL OPERATION OF THE FPD 50W-150 POWER SUPPLY

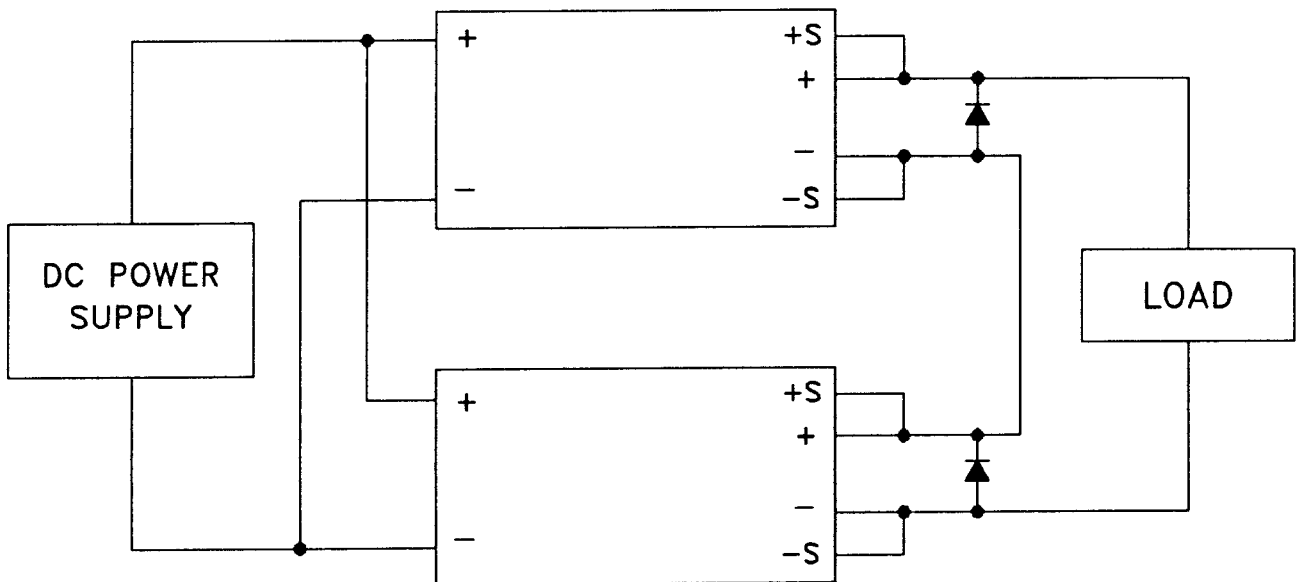


FIGURE 8 CONNECTION FOR SERIES OPERATION OF THE FPD 50W-150 POWER SUPPLY

You must register your product to comply with the terms of the warranty. Either fill out the form below and mail or fax to Kepco, or for rapid on-line registration go to:

<http://www.kepcopower.com/warranty.htm>

PRODUCT PURCHASED:

Model Number) _____
Serial Number _____

PURCHASE INFORMATION:

Date Purchased: _____
Date Received: _____

REQUEST ADDITIONAL INFORMATION

- Send complete Catalog
- Have Sales Engineer Call
- Contact via: E-Mail Telephone Fax S-mail

REGISTER TO:

Registered by: _____
Company Name: _____
Street: _____
City: _____
State: _____
Country: _____
Zip: _____
E-mail: _____
FAX: _____
Phone: _____

WHAT INFLUENCED YOUR CHOICE OF THIS POWER SUPPLY?

- Previous Experience (which Kepco Models do you have?)

- Magazines (which ones?) _____

- Trade Shows (which ones?) _____
- Directory? _____

- Kepco Catalog or Brochure? _____
- Sales Representative?
- Web Site
- Other (please explain): _____

What products would you like to see Kepco make?

CUT HERE

Kepco 1 Year Warranty

This is to certify that we, KEPCO, INC., (hereinafter called "Company"), Flushing, NY 11355 USA, warrants for a period of ONE YEAR, this instrument known as:

MODEL: _____

SERIAL NO. _____

The Company's products are warranted for a period of one year from date of delivery to be free from defects in materials and workmanship and to conform to the specifications furnished or approved by the Company. Liability under this warranty shall be limited to the repair or replacement of any defective product at Company's option.

If any defect within this warranty appears within the warranty period, the Purchaser shall promptly notify the Company in writing. No material will be accepted for repair or replacement without written authorization of the Company.

Upon such authorization, and in accordance with instructions of the Company, parts or materials for which replacement is requested shall be returned to the Company for examination, with shipping charges prepaid by the Purchaser. Final determination as to whether a product is actually defective rests with the Company.

This warranty does not extend to any product which has been subjected to misuse, neglect, accident, improper installation, or use in violation of instructions furnished by the Company. The warranty does not extend to, or apply to, any unit which has been repaired or altered outside of the Company's factory by persons not expressly approved by the Company.

THE WARRANTY HEREIN CONTAINED IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, INCLUDING WITHOUT LIMITATION THE WARRANTY OF MERCHANTABILITY.

THIS KEPCO PRODUCT IS WARRANTED FOR ONE YEAR!

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